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THE GENUS *COCCALICUS* WILLMANN, 1952
BELONGS TO THE FAMILY IOLINIDAE
(ACARI: TYDEOIDEA)

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(Accepted September 2005)

**SYNOPSIS:** The genus *Coccalicus* Willmann, 1952 is transferred from the family Alycidae (formerly Pachygnathidae) to the Iolinidae (Tydeoidea). The genus *Paratydaeolus* André, 1980 is a junior synonym of *Coccalicus*. The species *Coccalicus clavatus* Willmann, 1952 is redescribed and compared with *P. lukoschusi* André, 1980, type species of the genus.

**MATERIAL AND METHODS**

The holotype and single specimen was mounted under a small piece of coverslip. Although some details (e.g. the poroidotaxy) were difficult to observe due to bubbles in the mounting medium and the position of the specimen (Figs. 1A), it was decided not to remount the mite, because it is tiny and quite translucent.

The left side of the slide bears a label with two handwritten words in pencil “Wangerog” and “Genist.”; a similar label on the right side bears the handwritten identification “*Coccalicus* n. g.” in pencil next to a small printed label “Det. C. Willmann”.

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Figs. 1: *Coccalicus clavatus*, holotype tritonymph. A. — Dorsal habitus; B. — Tarsus I; C. — Tarsus II. Scale bars: A: 50 µm; B,C: 20 µm.
For the redescription we used photographs taken with a Leica TC200 digital camera mounted on a Leica DM LB microscope equipped with phase contrast optics. From the 51 source pictures of *C. clavatus*, 33 photographs, were combined with the Auto-Montage program (version 3.03.0103 by Synoptics Ltd) as explained in André & Ducarme (2003). Despite the bad state of Willmann’s type, images were not retouched and digital manipulations of the images were confined to routine operations to reduce field size, transform 30-bit color into 256 gray images, and significantly improve the contrast.

The leg chaetotaxy of *Coccalicus* corresponds to that of the genus *Paratydaeolus*, erected by André (1980). *Paratydaeolus* is thus a junior synonym of *Coccalicus*. Consequently, the genus *Coccalicus* is transferred from the Alycidae (formerly Pachygnathidae) to the family Iolinidae (Tydeoidea) as recently redefined by André & Fain (2000).

The type species of the genus is *C. clavatus* by original designation.

**Redescription of Coccalicus clavatus**

Prodorsum procurved; no eyes; sensilla clublike. Opisthosoma: dorsal chaetotaxy 11 (l2 missing); poroidotaxy not seen; genital organotaxy (1-4); epi- meral formula: (3-1-4-3). Legs: I(12-5-4-6-1), II(8-2-4-3-1), III(7-2-1-3-1), IV(7-2-1-2-0).

Overall, Willmann’s species resembles *Paratydaeolus lukoschusi* in the striation pattern and the shape of prodorsal trichobothria. Both have the same geographical origin, the North of Western Europe. Therefore, a comparative description is given hereafter.

The single specimen of *clavatus* was so flattened that the anterior limit of the prodorsum could no longer be seen. In toto, it was 214 µm long (and not 165 µm as published in the original description). The

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**RESULTS**

**Synonymy of Coccalicus with Tydaeolus**

The habitus, empodium and claws are typical of the Tydeoidea (Fig. 1) and it is difficult to explain why Willmann (1952) ascribed *Coccalicus* to the Pachygnathidae (currently named Alycidae, see Judson, 2000), i.e. to a wrong order (Endeostigmata). The genital chaetotaxy is that of a tritonymph. Because the leg chaetotaxy in Tydeoidea does not differ between the tritonymph and adult, it is easy to compare Willmann’s specimen to the tydeoid generic descriptions.
Figs. 3: Opisthosoma of *Coccilicus clavatus* A & C. — Holotype tritonymph B, D. — *Paratydaeolus lukoschusi* paratype tritonymph. Central area between *d1*, *l1* and *d3* (A & B), posterior tip (C & D). Scale bar: 20 μm (same magnification for all figures).
length of the idiosoma (gnathosoma excluded) was estimated to 188 \( \mu \text{m} \). It is smaller than the three paratype tritonymphs of *Paratydaeolus lukoschusi* (mean total length: 228 ± 14 \( \mu \text{m} \); mean length of the idiosoma: 201 ± 14 \( \mu \text{m} \)).

The striation pattern was very fine and difficult to discern in *C. clavatus*. Overall, it seemed to be similar to that of *P. lukoschusi* (ANDRÉ, 1980, Fig. 12): longitudinal on the prodorsum and transverse on the opisthosoma. However, a closer examination revealed subtle differences between the two species.

The number of striae between setae (vi), NS(vi), has already been used to discriminate species in Tydeidae (ANDRÉ, 2005). In *P. lukoschusi*, NS(vi) is 17 (Fig. 2B). In *C. clavatus*, NS(vi) is difficult to estimate due to the bad state of the specimen, but it appears to be around 15 (Figs. 2A). However, the two species differ by the density of striae in the central area of the prodorsum: 48/20 \( \mu \text{m} \) in *clavatus* versus 37/20 \( \mu \text{m} \) in *lukoschusi* (Fig. 2).

The striae on the opisthosoma are also denser in *clavatus* than in *lukoschusi* (Fig. 3). The striation pattern is somewhat different. In *lukoschusi*, the striation is slightly V-shaped between setae (dl), while it is transverse in *clavatus*. Between setae (d2), the situation is the reverse: the striation is slightly inverted V-shaped in *clavatus* and transverse in *lukoschusi*.

The relative position of prodorsal setae also differs between the two species; this character has already been used to discriminate species in the tydeoid genus *Ereynet es* (FAIN & CAMERIK, 1994). In *clavatus*, the distance between setae (ve) is greater than that between setae (sci), while the ratio is reversed in *lukoschusi* (1,01 vs 0,97). In other words, setae (ve) are in front of or external to (sci) in *clavatus*, whereas they are in a more internal position in *lukoschusi* (Figs. 2).

The two species also differ in the prodorsal trichobothria. Overall, the trichobothria are clubbed in the two species but those of *clavatus* seems to be more rounded. Not only do the trichobothria have a different shape, but the density of barbules covering the bulb is greater in *lukoschusi* than in *clavatus* (Figs. 4A, B). A higher density of barbules was also observed in the adult of *P. lukoschusi* (Fig. 4D).

Given the state of the single specimen of *clavatus*, it was difficult to determine other key characters likely to separate it from the type species of *Paratydaeolus*.

**Discussion**

Originally, the genus *Coccalicus* was monospecific; it now includes eleven species given that *Paratydaeolus* is a junior synonym of *Coccalicus*. Species attributed to this genus are small, live in various habitats (soil, stored products, bark, leaves, birds) and have been reported from Europe, Antarctica and North America. Despite the diversity of habitats they occupy, the number of *Coccalicus* species described so far is low (for comparison, the genus *Tydeus* inclu-
des more than 200 species). Among the potential reasons for this low number of described species are the weak diversification of the genus and the disregard for small species of no agronomic interest. Both hypotheses are discussed in detail by André & Fain (2000).

The comparison between clavatus and lukoschusi, highlights the difficulties in defining “good” species characters in these tiny mites. The use of the striation pattern in Tydeidae was already suggested by Baker (1965), but depending on the genus, the pattern may be variable or not. The density of striae is an other character recently used by André et al. (2004) and André (2005). However, the study of this character requires digital imaging, a sophisticated technology still little used in mite descriptions. In many cases, mite specimens are more or less deformed; counting striae is therefore not possible on a single plane image. Direct counting on the microscope or drawing striae is therefore not possible on a single plane. The density of barbules covering the bulb is probably less dependent from the mounting conditions than the shape of the bulb but is a new character that needs confirmation from future observations. It also requires digital imaging for the same reasons as the counting of striae.

The comparison of prodorsal trichobothria in clavatus and lukoschusi offers a good opportunity to outline the advantages of digital imaging compared to drawings (see Figs. 4C, D). Overall, the trichobothria are similar in the two species although they seem to be more rounded in clavatus. However the shape of trichobothria depends on many factors: the species, possibly the stase and individual, the specimen treatment (lactic acid or not...), the pressure exerted on the coverslip during mounting, the orientation and, as far as drawings are concerned, the artistic talent of the descriptor. The density of barbules covering the bulb is probably less dependent from the mounting conditions than the shape of the bulb but is a new character that needs confirmation from future observations. It also requires digital imaging for the same reasons as the counting of striae.

The last argument for the recognition of clavatus and lukoschusi as two distinct species is their habitats. Both species are recorded from Western Europe, from Germany and the Netherlands, respectively. However, Coccalicus clavatus was collected from “Altes Anspüllicht von Winterhochfluten” (Willmann, 1952), i.e. from old beach wrack after winter high floods, while lukoschusi was found on the Blue Tit, Parus caeruleus Linnaeus. The wrack mite fauna usually includes species adapted to living in the intertidal zone (Schuster, 1979; Travé, 1981). However, we cannot exclude the possibility that the single specimen collected by Willmann had strayed from its “normal” habitat and that C. clavatus was an accidental species on the beach. In contrast, it seems very likely that lukoschusi is parasitic — or at least commensal — on the Blue Tit. Indeed, a total of 13 individuals were collected, representing most stases (5 females, 2 tritonymphs and 5 deutonymphs, 1 larva). The two species seemingly live in different habitats.

Therefore, we rather propose to recognize the two species as distinct, with clavatus as type species of the genus Coccalicus. Until new specimens of clavatus are found, Coccalicus lukoschusi, serves as the reference species since, contrary to the German species known only by a tritonymph in bad a state, types are in good condition and most stases — including the adult — are known. Other species of Coccalicus are too poorly known to allow detailed comparison and will have to be redescribed using digital imaging.

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REFERENCES


Captions